P-10.3 Exemplify the concept of entropy.

Revised Taxonomy Level 2.2-B Exemplify conceptual knowledge

Students did not address this concept in physical science

It is essential for students to

- Understand that entropy is a measurement of the amount of disorder in a system
- Understand that entropy can be expressed as a mathematical equation, stating that the increase in entropy, ΔS, in and ideal thermodynamic system is equal to the amount of heat added to a system, ΔQ, divided by the temperature, T, of the system: $\Delta S = \Delta Q/T$.
- Entropy is a manifestation of the second law
  - Whenever energy freely transforms from one form to another, the direction of transfer is toward a state of greater disorder.
  - The entropy of the universe is always increasing.
- Explain familiar systems in terms of entropy
  - Gas molecules escaping from a bottle.
  - Heat always flows from a hot object to a cold object.
  - Efficiency of machines is always less than 100%.

Assessment

The verb exemplify means to find a specific example or illustration of a concept or principle, therefore the major focus of assessment will be for students to give examples that show that they understand how familiar energy transformations are based on the principle of entropy increase. Conceptual knowledge requires that students understand the interrelationships among the basic elements within a larger structure that enable them to function together; in this case, that students understand the laws of thermodynamics as they apply to familiar systems